

CHEMISTRY QUESTION PAPER

Time : 2 Hrs.

Max. Marks : 40

Note :

- (i) All questions carry equal marks.
- (ii) Give balanced equations and draw diagrams wherever necessary.
- (iii) Use of logarithmic table is allowed.
- (iv) Figures to the right indicate full marks.
- (v) Answer to every question must be written on a new page.

Q. 1 Select and write the most appropriate answer from the given alternatives for each sub-question. [8]

- (i) Which of the following ions is colourless? (1)
(a) Zn^{2+} (b) Ni^{2+} (c) Co^{2+} (d) Fe^{2+}
- (ii) Among the following equimolar solutions identify the one having highest boiling point. (1)
(a) Urea (b) Sucrose (c) Sodium chloride (d) Sodium sulphate
- (iii) The order of reaction between equimolar mixture of H_2 and Cl_2 in the presence of sunlight is (1)
(a) 0 (b) 1 (c) 2 (d) 3.
- (iv) The enthalpy of which of the following substances in standard state is zero? (1)
(a) Carbon (b) Calcium carbonate (c) Ammonia (d) Nitric acid.
- (v) The basic principle used in Hydrogen bomb is (1)
(a) Nuclear fission (b) Nuclear fusion
(c) Nuclear disintegration (d) Artificial radioactivity.
- (vi) Ostwald's Dilution Law is applicable in case of dilute solution of (1)
(a) HCl (b) H_2SO_4 (c) NaOH (d) CH_3COOH
- (vii) When a change of 1 Faraday is passed through $AlCl_3$ solution, the amount of Aluminum deposited at cathode in gram is (At. Wt. of Al = 27) (1)
(a) 9 (b) 18 (c) 27 (d) 2.7
- (viii) The heat of Neutralization of HCl by NaOH solution is - 57 kJ. The heat liberated in neutralization of 109.5×10^{-3} kg of HCl is (1)
(a) 57 KJ (b) 114 KJ (c) 171 KJ (d) 117 KJ.

Q. 2 (A) Attempt any one : [8]

- (i) State and explain the van't Hoff-Boyle's Law. (2)
- (ii) Give one statement of First Law of Thermodynamics and give its corollary. (2)

(B) Attempt any one :

- (i) Derive Ostwald's Dilution Law for weak acid. (2)
- (ii) State and explain Faraday's Second Law of Electrolysis. (2)

(C) Answer the following :

- (i) Distinguish between Molecularity of reaction and Order of reaction. (2)
- (ii) Give names and formulae of any 'two' ores of Zinc. (2)

Q. 3 (A) Attempt any one : [8]

- (i) Define Hydrolysis of salt and show that degree of hydrolysis of salt of weak acid and weak base is independent of concentration of solution. (3)
- (ii) What is Artificial Transmutation? Write nuclear reactions for artificial transmutation using alpha particle and neutron as projectiles. (3)

(B) Attempt any one :

- (i) What is Rate Law? Show that, half life of first order chemical reaction is independent of initial concentration of the reactant. (3)
- (ii) Give the observed outer electronic configuration of Copper (Z = 29).
Why are compounds of Copper 'coloured' while those of Zinc 'colourless'? (3)

(C) Answer the following :

Define : (1) Mole fraction, (2) Faraday. (2)

Q. 4 (A) Answer the following : [8]

State and explain Hess's Law of Constant Heat Summation and give its 'four' (4)

(B) Attempt any one :

- (i) Describe the construction and working of Standard Hydrogen electrode.
Give its 'two' disadvantages. (4)
- (ii) Describe Landsberger - Walker method for the determination of molecular weight of solute by boiling point elevation. (4)

Q. 5 (A) Attempt any one :

- (i) Heat of following reaction at constant volume (ΔE) at 300 K is



Calculate the heat of formation of water at 500 K.

The mean molar heat capacities at constant pressure in the given range of temperature are $\text{H}_{2(g)} = 28.87$, $\text{O}_{2(g)} = 27$ and $\text{H}_2\text{O}_{(l)} = 75.3 \text{ J/K/mol}$. [$R = 8.314 \text{ J/K/mol}$] (4)

- (ii) The NH_4OH is 4.3% ionized at 298 K in 0.01M solution.

Calculate the ionization constant and pH of NH_4OH . (4)

(B) Attempt any two :

- (i) A solution is prepared by adding 3.7 moles of NaCl to 9.8 moles of water.
What is the mole fraction of NaCl and H_2O in the solution ? (2)
- (ii) A current of 5 amperes was passed through a solution of silver nitrate for 5 minutes when $1.677 \times 10^{-3} \text{ kg}$ of silver was deposited at cathode.
Calculate electrochemical equivalent of silver. (2)
- (iii) Calculate the time taken by radio element to reduce 25% of its initial activity, if disintegration constant of radio element is $6.93 \times 10^{-2} \text{ day}^{-1}$. (2)